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Extraction of Cataract with-
out Iridectomy.

*Report of One Hundred Cases, with
Remarks.*

BY

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EXTRACTION OF CATARACT WITHOUT IRIDECTOMY.

*REPORT OF ONE HUNDRED CASES, WITH REMARKS.**

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WITHIN the last three years the old method of the extraction of cataract without iridectomy, which was formerly devised and practiced by the French surgeon Daviel, and called by him "simple extraction," has been revived by Panas, Wecker, and others, and has been in many quarters hailed with all the *éclat* of a new operation. Most of the modern French authors report very enthusiastically in its favor, but none of them have as yet given us any detailed or conclusive statistics in regard to the results obtained, nor any comparative statements as to the advantages of the "simple operation" over those of the so-called "linear extraction with iridectomy" devised by von Graefe, and practiced almost universally with great success for the last twenty-five or thirty years.

The ideal operation for the extraction of cataract is undoubtedly the removal of the lens in its capsule through a corneal section, and without wound or excision of the iris;

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and the restoration of sight in this manner, with the preservation of a round and movable pupil, is certainly to be regarded as one of the greatest of operative achievements.

Sufficient time has now elapsed since the revival of the old "simple operation" to enable us to draw some conclusions as to the merits of this method of operating and the results obtained, in so far as the ultimate vision is concerned; and the writer now presents to the association for their consideration his own experience in one hundred cases of extraction of cataract by the simple method without iridectomy.

As a firm believer in the value of antiseptics in ophthalmic surgery, the reporter deems it wise to give in detail all the steps which he considers necessary in the operation, from the preparation of the patient for the operation to the final testing of the vision and the discharge of the case from observation.

Preparation of the Patient.—If the patient be a hospital case, he should have a bath of the entire body the day before the operation, special attention being paid to the cleansing of the hair and beard with soap and water. This is not considered necessary in the case of a private patient. On the day of operation the patient's face should be carefully washed with soap and water, and just before the operation the face should be laved with Panas's solution of the biniodide of mercury, or with a solution of mercuric bichloride (1 to 5,000), or with a saturated solution of boric acid, and the latter solution should be used for irrigation of the conjunctival *cul-de-sac*. The patient should be placed in the bed which he is to occupy throughout the entire course of treatment, so as to avoid all unnecessary moving about. This precaution reduces to a minimum the dangers which may arise from prolapsed iris, opening of the wound, loss of vitreous, hæmorrhage, etc.

After the necessary local anaesthesia has been produced by a few drops of a five-per-cent. solution of cocaine hydrochloride, the conjunctival *cul-de-sac* is again thoroughly irrigated with the boric-acid solution, and the patient is then ready for the operation.

The instruments have previously been cleansed and sterilized in boiled water, and have been placed in a bath of absolute alcohol. From this bath they are taken wet as they are wanted for the operation. The hands of the operator and of the assistant, if he has any, are carefully cleansed with soap and water, and then washed with a solution of sublimate (1 to 2,000). Some operators prefer Panas's solution for purposes of cleansing and irrigation; this consists of mercuric biniodide, 0.05 gramme; alcohol, 20 grammes; and distilled water, 1,000 grammes.

The surgeon should sit behind his patient, and should operate on the right eye with the right hand and on the left eye with the left hand. In this way he is never in his own light. If he is not naturally ambidextrous, he should strive to make himself so. A speculum is then introduced to hold the lids open, and the eyeball is firmly grasped with a fixation forceps, the latter being made to seize the conjunctiva and subconjunctival tissue over the insertion of one of the straight muscles of the eye.

A straight, narrow knife, somewhat more slender than the cataract knife of von Graefe, is then introduced on the temporal side in clear cornea, near the limbus, and is passed quickly across the anterior chamber, horizontally in front of the iris, and is brought out at a corresponding point in clear cornea on the nasal side, and the incision is then completed, if necessary, by a to-and-fro movement. The length of the incision should involve about two fifths of the circumference of the cornea.

Some operators, in completing the corneal incision, make

a small conjunctival flap as a protection against secondary infection from the conjunctival *cul-de-sac*. I never make such a flap if it can be avoided, as I regard it as a useless complication unless the patient has a chronic conjunctivitis or dacryocystitis; and it undoubtedly increases the danger from primary infection by enlarging the wound. In making the corneal section, care should be taken to pass the knife quickly across the anterior chamber and thus complete the section as rapidly as possible. This prevents almost entirely the escape of aqueous humor, and there is but little danger that the iris will fall over the edge of the knife and be divided.

If the iris prolapse outside of the wound as soon as the section is completed, it is better to restore it to its place in the anterior chamber before opening the capsule. The capsulotome or angular cutting needle is then introduced and carried well behind the inferior margin of the sphincter of the iris, and the capsule is then lacerated by a T-shaped incision or, better, by a quadrilateral one, care being taken to avoid wounding the iris.

The extraction of the lens now follows. This is effected by pressure on the eye above the wound and counter-pressure on the lower portion of the cornea with a spatula or rubber spoon. This causes a gaping of the wound and a revolution of the lens upon its horizontal axis, the upper margin of the lens coming forward and presenting in the wound. A brief continuance of this pressure and counter-pressure causes the extrusion of the lens and a more or less extensive prolapse of the iris. It is perhaps safer to remove the speculum before this manœuvre is attempted, so as to avoid as far as possible the danger of prolapse of the vitreous. This should always be done in cases of complicated cataract, especially when the suspensory ligament is defective and the vitreous disorganized, or the lens partially dislocated.

The next step—a very important one—is the removal of the remnants of soft lens matter or cortex, if there are any, from the anterior chamber. This is best done by pressure with the fingers upon the eyeball through the closed lids; or by curette, or spoon, or spatula, by repeated slow movements of the instrument over the cornea from below upward toward the wound; or by repeated and continuous rotary massage of the lids upon the eyeball. These manœuvres should be accompanied by frequent irrigation of the conjunctival *cul de-sac*, and even of the anterior chamber, by a warmed saturated solution of boric acid or by Panas's fluid. It is very rarely necessary to introduce any instruments into the anterior chamber.

The next step is the replacing of the prolapsed iris. If the iris has not spontaneously reduced itself during the manipulations employed for removing the lens fragments from the anterior chamber, it may be readily replaced or reduced by a gentle stroking with a smooth probe or spatula. If on reduction of the prolapsed iris the pupil is neither central nor round, some surgeons consider it advisable to do an iridectomy at once, so as to avoid the necessity of doing it later. But it is much better to so choose your cases for simple extraction as to exclude all such cases as may possibly necessitate an iridectomy.

For irrigation of the anterior chamber any small lacrymal syringe may be used, but it should always be sterilized and kept exclusively for the purpose. The nozzle should be introduced between the lips of the wound, and the fluid used should be injected very slowly and gently and in small quantities.

The final steps in the operation before the application of the bandage are a careful irrigation of the lids and conjunctival *cul-de-sac* with the boric-acid solution and the instillation of a few drops of a solution of eserine sulphate

(half a grain to the ounce) into the *cul-de-sac*, or the application of an ointment of eserine of the same strength. This causes a contraction of the pupil, and thus aids in preventing a secondary prolapse of the iris.

The lids of both eyes are then closed, carefully and smoothly covered with a wad of antiseptic cotton, and a double roller flannel bandage applied over both eyes.

The after-treatment varies somewhat with the nature of the case and the temperament of the patient. The patient is to be kept in bed on an average for three or four days. He is allowed to sit up while eating and to rise from bed to satisfy the calls of nature. The room need not be darkened. It is my custom usually to remove the bandage and dressing on the next day, but without opening the eyes. The edges of the lids are to be gently cleansed with a saturated solution of boric acid or a solution of mercuric bichloride (1 to 5,000), and a drop of a solution of eserine sulphate is to be introduced. If there is much mucous secretion or any swelling of the lids, the lids are opened, the eyeball and conjunctival *cul-de-sac* are carefully irrigated with the boric acid solution warmed, and then the eye is carefully inspected. If, on the contrary, the lids look well, the eye is not inspected until the fourth or fifth day, but the dressings are renewed and the lids cleansed daily. If on the fourth or fifth day the pupil is round and central, the eye is carefully cleansed, and, if the wound has closed throughout, the bandage is discontinued except at night, and then is used only on the operated eye. The eye not operated upon is usually left uncovered after the second or third day. If the pupil is round and central and the wound closed, but circumcorneal injection or pain is present, a weak solution of atropia should be used at once several times a day until both these symptoms have subsided.

A few words now in regard to the accidents which may occur in the course of the operation :

1. The iris may fall upon the edge of the knife in its passage across the anterior chamber, and may be wounded or excised as the corneal section is completed. This accident may happen to any surgeon. The rapid passage of the knife across the anterior chamber to its point of exit in the cornea on the opposite side, and the avoiding of any undue pressure on the eyeball by the fixation forceps, will go far toward preventing the occurrence of this accident. The rapid completion of the corneal section also aids in this endeavor. Should the iris be cut or excised in this first step of the operation, an iridectomy must be done at once, and the artificial pupil thus made clean and smooth.

2. *Prolapse of the Vitreous.*—This may occur at any period during the operation, and is always a misfortune. In the hands of a careful operator it is usually slight, and need not interfere with the usual careful manipulations for causing the extrusion of the lens. Any portion of vitreous that remains in the wound after the lens has been removed must be cut off, and great care must then be exercised in any manœuvres undertaken for extracting the remains of cortex from the anterior chamber. It is well, also, in such cases, to avoid all irrigation of the anterior chamber, as it will be very apt to increase the loss of vitreous. Should the vitreous prove to be fluid and the prolapse extensive, the lens should be removed at once, either with the blunt hook or spoon, and the eyelids at once closed temporarily for a few minutes. Then the iris should be replaced, eserine instilled, and both eyes closed with the usual antiseptic dressings and bandage.

3. *More or Less Extensive Hæmorrhage into the Anterior Chamber.*—This may be in great part prevented by avoiding the conjunctival flap. If the hæmorrhage comes from a

wounded iris, the latter is to be smoothly excised, and then the further steps of the operation are to be interrupted until the hæmorrhage has been controlled and the blood, as far as possible, removed from the anterior chamber, as its presence interferes with the proper opening of the capsule and the removal of the lens.

COMPLICATIONS OR ANOMALIES OF THE HEALING PROCESS.—There are several of these complications, which will be considered in the order of the frequency of their occurrence:

1. *Posterior synechiæ* or adhesions of the posterior surface of the iris to the remains of the anterior capsule of the lens. These are very common, and are in many cases filiform or thread-like in character. They rarely obstruct the pupillary area. They are caused by the edges of the lacerated anterior capsule coming in contact with the pupillary margin of the iris, which has already been bruised in the passage of the lens through the pupil. These adhesions occur independently of any actual iritis.

2. *Iritis*, usually of the mild, plastic type, and very often involving only a segment of the circumference of the iris. This is best combated by a weak solution of atropine and warm applications.

3. *More or Less Complete Obstruction of the Field of the Pupil by the Opaque or Thickened Posterior Capsule of the Lens*.—This is a very common complication of the healing process, and usually requires some operative interference—such as discission or some more serious surgical procedure, to be described later.

4. *A more or less irregular pupil*, usually oval, caused by a puckering of the iris in the upper part of the angle of the anterior chamber, without there being any actual adhesion or incarceration of the iris tissue in the lips of the corneal wound. For this there seems to be no remedy of any actual value.

5. *Incarceration of the iris* in the corneal wound, or else merely anterior synechiæ, a more or less marked adhesion of the iris to the inner lips of the wound. The use, once or twice a day, of a drop or two of a half-grain solution of eserine sulphate sometimes succeeds in breaking these adhesions, though more frequently it does not succeed; and it may prove disadvantageous by causing irritation of the iris, and thus increase the chances of posterior synechiæ.

6. *Secondary Prolapse of the Iris*.—If this occurs early and it can not be reduced, it should be cut off as neatly as possible, and the edges gently stroked into place in the anterior chamber. If the wound has already partially closed and the prolapse of the iris is a late occurrence, it is better to leave it undisturbed by any manipulation. This secondary prolapse of the iris is almost always of traumatic origin, from some sudden jar or displacement of the bandage on the part of the patient, and its prevention depends largely on careful nursing. Great care in operating and the rigid exclusion of all unsuitable cases—such as rigidity of the iris, prolapse of the vitreous, dislocation of the lens, or unmanageable patients—will all undoubtedly aid in reducing the cases of secondary prolapse of the iris to a minimum.

7. *Capsulitis, or Inflammation of the Capsule of the Lens*.—This is almost always of the mildly plastic character, and is usually associated with the mild form of iritis. Should it prove to be of the suppurative type, it is almost invariably accompanied by a purulent inflammation of the iris and infiltration of the tissue of the cornea in the vicinity of the wound, and is always the result of secondary infection from without.

8. *Suppuration of the Lips of the Wound in the Cornea*.—This is always the result of secondary infection, and, if not combated at once, may end in total loss of the eye from suppurative panophthalmitis. Its cause is usually some

chronic inflammation of the palpebral conjunctiva or lacrymal sac, and it should be treated at once by a removal of the dressings and bandage, frequent irrigation of the wound, eyeball, and *cul de-sac* with a hot solution of mercuric bichloride (1 to 5,000), and prompt cauterization of the entire length of the wound by the galvano-cautery. This may be repeated daily, if the surgeon deem it necessary, as long as it seems to influence the course of the suppurative process. If the latter increases in extent, in spite of hot applications and the cautery, the latter does no good, and should be discontinued.

SECONDARY OR AFTER-OPERATIONS.—An important factor in the restoration of good visual acuity in cases of cataract extraction is the performance of what are called secondary or after operations. These are usually of two kinds: 1. Discission or laceration of the posterior capsule. 2. Excision of a piece of thickened capsule or of a piece of membranous tissue, composed of thickened capsule and the products of inflammatory exudation. The gain in sight from a secondary operation is often very great.

1. *Discission or laceration of the posterior capsule* is very often, perhaps in the majority of cases, necessary, but sometimes is dangerous. It is a delicate operation, requiring great nicety in manipulation, good judgment and perfect sight on the part of the surgeon, a sharp knife-needle, and a good light. It is sometimes necessary to employ the electric light in this delicate operation. The capsule may be lacerated by a simple stop-needle with a double cutting edge, but by far the best instrument is a slender, sharp, curved knife-needle, with a sharp point and a curved cutting edge, shaped something like a sickle. This is plunged through the cornea on either side, near the limbus, and the capsule is then lacerated by a single vertical or transverse stroke of the blade, or, if necessary, a crucial in-

cision is made through the capsule. Under cocaine, this may be done by a good operator without the employment of fixation forceps, and this is an advantage, as all undue pressure upon the eyeball is thus avoided. The danger of the operation is proportionate to the density and duration of the pupillary capsular membrane. A capsule which is not thickened by the products of inflammation can be lacerated easily and without danger; but pseudo-membranous opacities resulting from iritis or iridocyclitis must be approached with caution. This leads to a brief consideration of the second variety of after-operation.

2. *Excision of a Piece of Thickened Capsule or of a Pseudo membrane, and its Removal from the Field of the Pupil and the Interior of the Eye.*—This may be done by making an incision in the cornea near the limbus, and employing the narrow cataract knife or Beer's triangular knife to cut out a triangular piece of the opaque membrane, and its removal by Tyrrell's blunt hook, or by the introduction of Wecker's knife-scissors through the corneal wound, and the excision and removal of a triangular piece of membrane. This is an extremely delicate, somewhat difficult, and dangerous operation, as the operation may set up a fresh attack of iritis or iridocyclitis, with possibly subsequent closure of the gap made by the knife, or somewhat rapid phthisis bulbi or atrophy of the globe.

Some variations in the general technique of the operation of extraction of cataract without iridectomy have been proposed by different surgeons. Panas always employs an alcoholic solution of the biniodide of mercury as an antiseptic fluid for the irrigation of the anterior chamber. Some writers have used a solution of mercuric bichloride (1 to 10,000) for the same purpose. Knapp found that when small quantities of the latter were employed there was no reaction, but that the injection into the anterior chamber of

moderate quantities was followed by more or less transient opacity, appearing in patches on the posterior surface of the cornea. He has therefore abandoned its use in favor of Panas's fluid or a saturated solution of boric acid.

Most surgeons make the incision in the cornea in its upper section, and this is undoubtedly wise, as the chances of secondary prolapse of the iris or loss of vitreous are much diminished, and because the corneal scar, if there be any, is partially concealed by the normal position of the upper lid.

Another modification of the technique of the operation as described in this paper is in the manner of opening the capsule, which consists in lacerating the capsule with the point of the cataract knife while making the corneal incision. This is the revival of a method practiced many years ago by Wenzel and other German surgeons, the capsule being split horizontally in the upper portion of the pupillary space. It was thought that it simplified the operation of extraction, and it certainly demands one instrument the less. It is a difficult manœuvre to perform, and may cause the corneal wound to be irregular and even ragged, and thus protract the healing process. If the capsule were thick, the knife would probably fail to penetrate it, and there would be some danger of causing rupture of the zonule and dislocation of the lens. It would be a very difficult manœuvre if the pupil were narrow and the anterior chamber shallow, and the iris would probably be wounded in such a case. In the opinion of the writer, this method of opening the capsule should be abandoned.

Comparison of the Two Methods of extracting Cataract, with and without Iridectomy.—The advantages of simple extraction without iridectomy are as follows :

1. It preserves the natural appearance of the eye, a central, circular, and movable pupil.

2. The acuteness of vision, other things being equal, is greater than after the old operation.

3. Eccentric vision and orientation are much better than by the old operation.

4. Small particles of capsule are not so likely to be incarcerated in the wound, and thus act as foreign bodies and excite irritation.

5. The necessity of after-operations is probably not so great as after the old operation.

The *disadvantages* of simple extraction are as follows :

1. The technique of the operation is decidedly more difficult. The corneal section must be larger in order that the extrusion of the lens may be facilitated, as the presence of the iris acts as an obturator or obstacle to its passage. The corneal section must be performed rapidly so as to avoid the danger of the iris falling on the knife and being excised. The cleansing of the pupillary space and the posterior chamber is much more difficult than after the old operation.

2. Posterior synechiæ, secondary prolapse, and incarceration of the iris are more frequent than after the old operation.

3. The operation is not applicable to all cases. This objection, however, applies to all operations.

Indications for performing Iridectomy.—The indications for performing an iridectomy in cases of cataract extraction may be formulated as follows :

1. When the vitreous is fluid or the zonula is ruptured, causing non-presentation of the lens and prolapse of the vitreous.

2. Insufficient length of the corneal section with prolapse of the iris.

3. Bruising of the iris during the operation.

4. A stiff, unyielding sphincter iridis.

5. Irreducible prolapse of the iris after the completion of the operation.

A few words in regard to the wisdom of the employment of general antiseptic rules.

1. The removal and exclusion, as far as is possible, of all bacteria by the employment of unirritating, aseptic fluids for all purposes of cleansing and irrigation, the best of these being boiled water or boiled boric-acid solution.

2. The employment, whenever necessary, of some really valuable antiseptic solution, such as chlorine-water, mercuric bichloride, or silver nitrate, the indications for their use being the appearance of the slightest muco-purulent secretion from the conjunctiva, or cloudiness of the lips of the wound.

3. The fearless employment of the galvano-cautery to the whole length of the corneal wound, if the lips of the wound show any signs of infiltration.

4. The performance of the operation with the most extreme neatness and accuracy, and with the minimum of traumatism.

5. Endeavor to obtain primary union of the wound by careful removal from between the lips of the wound of all foreign substances, and by perfect coaptation of the edges, and the maintenance of the most complete immobility of the organ possible until the wound is firmly closed.

Of the one hundred eyes on which this operation of the "simple extraction" of cataract was performed, useful vision was regained in all save one. This case was that of a patient whose eye had been rendered entirely blind by frequent attacks of irido-chorioiditis, and the lens was removed simply to allay the severe pain, and possibly to aid in quieting the inflammatory process. Not a single eye was lost from sup-puration.

Fifty-two of the patients were males and forty-eight

were females. The youngest patient was thirteen years old and the oldest was eighty-seven. The complications existing were as follows: Corneal macula or opacity in nine cases, broad arcus senilis in nine cases, old chorio-retinitis in six cases, chronic Bright's disease in five cases, chronic bronchitis and asthma in four cases, diabetes mellitus in two cases, dilated and immovable iris from a contused wound in two cases, conjunctivitis and marginal blepharitis in two cases, irido-chorioiditis and blindness in one case, posterior synechiæ from old iritis in one case, pulmonary phthisis in one case, and hypertrophy and valvular disease of the heart in one case.

The reduction of the prolapsed iris after the extraction of the lens occurred spontaneously in fifty-six cases, and the iris was replaced by the spatula in forty-four cases. In eighty-three cases there was neither incarceration nor secondary prolapse of the iris. In fifty-three cases there were no posterior synechiæ or adhesions of the iris to the lacerated capsule. In forty-seven cases these adhesions were present, and in ten of these they were due to plastic iritis.

The healing process was normal in eighty-six cases, though in some the process was very slow, especially in the closure of the external lips of the wound.

Iritis of the mild plastic type occurred in ten cases, and retraction of the iris toward the ciliary processes in three cases. There was loss of corneal epithelium in two cases, and "striped" keratitis in one case. The wound became infiltrated in three cases, necessitating the use of the galvano-cautery. Chorioiditis and hyalitis occurred in two cases, and irido-chorioiditis with occlusion of the pupil also in two cases. Capsulitis followed in one case.

The accidents which occurred during the operation were

as follows: 1, loss of vitreous in thirteen cases; 2, hæmorrhage into the anterior chamber in two cases; 3, complete collapse of the cornea in two cases; 4, dislocation of the lens in three cases; 5, the lens was removed with the blunt hook in five cases.

The duration of the treatment varied from eleven days, the shortest period, to forty-seven days, the longest period.

Secondary or after operations were done in fifty-three cases—discission or laceration of the capsule in fifty cases, and excision of a piece of capsule or pseudo-membrane in three cases.

The resultant degree of vision in the one hundred cases was as follows: In six cases, $\frac{2}{2} \frac{0}{0}$; in thirteen cases, $\frac{2}{3} \frac{0}{0}$; in twenty-four cases, $\frac{2}{4} \frac{0}{0}$; in twenty-two cases, $\frac{2}{6} \frac{0}{0}$; in twenty-one cases, $\frac{2}{7} \frac{0}{0}$; in ten cases, $\frac{2}{10} \frac{0}{0}$; in two cases, $\frac{2}{20} \frac{0}{0}$; counting fingers at several feet in one case. No perception of light in one case, eye previously blind for many years.

No.	Nature of cataract.	Complications.	Operation.	Reduction of iris.	Healing process.	Second try prolapse or incarceration of iris.	Posterior synechia.	Duration of treatment.	Primary vision.	Secondary operation.	Ultimate vision.
1 F 68	Senile, hard, L. E.	Broad arcus senilis.	L. E. prolapse of vitreous at moment of capsulotomy; lens removed by hook; collapse of cornea; hemorrhage into anterior chamber.	By spatula.	"Striped" keratitis; slow healing of lips of wound.	None.	One.	Days 23	20/200	Dissection of posterior capsule 4 weeks later.	20/50
2 M 13	Traumatic 8 mcs. before; R. E.	Tremulous iris; dilated pupil.	Normal, except slight loss of vitreous after extrusion of lens.	Spontaneous.	Normal.	None.	Two.	15	20/50		20/40
3 F 35	Traumatic; blow 1 m cork 3 mos. ago; R. E.	None.	Normal.	Spontaneous.	Normal.	None.	None.	18	20/100		20/70 +
4 M 21	Traumatic 4 yrs. ago; R. E.	None.	Normal.	Spontaneous.	Normal.	None.	None.	20	20/100	Dissection of thickened capsule 3 wks. later.	20/70
5 F 70	Senile, hard; R. E.	Corneal macula.	Normal.	By spatula.	Normal.	None.	None.	21	20/200		20/70
6 F 22	Traumatic; R. E.	None.	Normal.	By spatula.	Normal.	None.	None.	24	20/100		20/100
7 F 55	Hard, unclear; R. E.	None.	Considerable soft lens matter carefully evacuated by pressure; irregular coaptation of lips of wound.	Spontaneous.	Slow.	None.	Two.	26	20/200	Dissection 4 wks. later.	20/20
8 M 60	Senile & traumatic; R. E.	None.	Normal.	By spatula.	Slow.	None.	None.	22	15/200	Dissection 3 wks. later.	20/70
9 M 42	Traumatic; R. E.	Incipient cataract in other eye.	Normal.	Spontaneous.	Normal.	None.	None.	16	20/100	Dissection 2 wks. later.	20/50 +
10 M 62	Traumatic; R. E.	Ant. polar cat. in L. E. for many years.	Normal.	By spatula.	Slow.	None.	None.	22	10/200	Dissection 4 wks. later.	20/100 +
11 M 65	Hard, senile.	Aphakia in L. E. with old chorioiditis.	Prolapse of vitreous at once; lens dislocated downward and inward, and removed in its capsule by blunt hook.	By spatula.	Slow; iritis.	None.	Several.	28	8/200	Laceration of dense membrane 6 wks. later.	20/70 +
12 M 38	Traumatic, unclear; L. E.	None.	Normal.	Spontaneous.	Slow; iritis.	None.	Several.	26	20/200		20/50 -
13 M 70	Hard, senile; R. E.	Broad arcus senilis.	Prolapse of vitreous; retraction of iris; lens dislocated downward, and removed in its capsule with spoon; loss of considerable vitreous.	By spatula.	Very slow; opacities and membrane in vitreous.	None.	One.	38	10/200	Dissection 5 wks. later.	20/100
14 F 78	Hard; R. E.	None.	Normal.	By spatula.	Normal.	None.	Two.	28	20/70	Dissection 4 wks. later.	20/40 +
15 F 40	Traumatic; R. E.	Incipient cat.; L. E.	Normal.	Spontaneous.	Normal.	None.	One.	15	20/70		20/40 +
16 M 47	Traumatic; R. E.	None.	Normal; much soft cortex; free irrigation of anterior chamber.	By spatula.	Irido-cyclitis; dense membrane in pupil.	None.	Several.	47	3/200	Removal of a triangular piece of membrane 3 wks. later.	20/200 +
17 F 68	Hard; L. E.	None.	Normal.	By spatula.	Normal.	None.	None.	16	20/70		20/40
18 F 79	Hard; L. E.	None.	Normal.	By spatula.	Slow.	None.	None.	24	20/100		20/40
19 M 45	Hard; R. E.	None.	Normal.	By spatula.	Normal.	None.	None.	22	20/200		20/50
20 M 64	Hard; L. E.	R. E.; pithitis following extraction of cataract 15 mcs. before.	Normal.	By spatula.	Wound healed on 31 day; on 9th day loss of epithelium from lower half of cornea; this was regenerated in 3 days under bandage.	None.	One.	19	20/70 +		20/50 +
21 F 66	Hard; R. E.	None.	Normal.	By spatula.	Slow.	None.	Two.	19	20/100	Dissection 3 wks. later.	20/70 +
22 F 70	Hard; R. E.	None.	Normal.	By spatula.	Slow.	None.	Two.	22	20/100		20/70 +
23 M 65	Hard; R. E.	Old chorioiditis.	Normal.	By spatula.	Corneal epithelium raised by clear fluid in spots, like those in keratitis bullosa.	None.	Two.	14	20/200		20/300 +
24 M 46	Hard; L. E.	Macula corneae.	Normal.	Spontaneous.	Normal.	None.	None.	16	20/100		20/70
25 M 17	Traumatic; R. E.	None.	Normal; post. capsule torn by needle.	Spontaneous.	Normal.	None.	Two.	12	20/50 +		20/36 +
26 M 60	Hard; L. E.	None.	Normal.	By spatula.	Slow.	None.	None.	20	20/100 +		20/50 +
27 F 54	Hard; L. E.	Old chorioiditis.	Normal.	By spatula.	Slow; iritis.	None.	One.	16	2/200		20/100 +
28 F 55	Hard; R. E.	Corneal macula.	Normal.	By spatula.	Normal.	None.	None.	22	20/100 +		20/70 +
29 M 27	Semi-hard.	Irido-chorioiditis, blind eye; great circumference of pupil.	Normal; iris separated from its adhesions to capsule throughout entire circumference of pupil.	By spatula.	Normal.	None.	Several.	14	0	Blind eye.	0
30 M 58	Hard; L. E.	Chronic conjunctivitis, but little secret'n.	Normal.	Spontaneous.	Normal.	None.	None.	16	20/100	Dissection 3 wks. later.	20/40 -
31 F 63	Hard; R. E.	Chronic conjunctivitis, but little secret'n.	Normal.	Spontaneous.	Normal.	Iris incarcerated.	None.	13	20/70 +		20/50 +
32 M 61	Hard; L. E.	None.	Normal.	Spontaneous.	Normal.	Iris incarcerated.	None.	14	20/50		20/40 +
33 M 64	Hard; L. E.	Chronic Bright's disease.	Profuse hemorrhage into ant. chamb., rendering operation very protracted.	Spontaneous.	Very slow; outer lips of wound long patentulous.	Iris incarcerated.	None.	32	20/200		20/70
34 F 56	Hard; R. E.	None.	Normal.	Spontaneous.	Normal.	Iris incarcerated.	None.	12	20/100		20/40 +
35 M 63	Hard; R. E.	Chronic Bright's disease.	Complete collapse of cornea.	Spontaneous.	Very slow; outer lips of wound long patentulous.	Iris incarcerated.	None.	30	15/200	Dissection 2 wks. later.	20/100
36 M 62	Hard; L. E.	Broad arcus senilis.	Normal.	Spontaneous.	Normal.	Iris incarcerated.	None.	13	20/70		20/40 -
37 M 64	Hard; R. E.	None.	Normal.	Spontaneous.	Normal.	No incarceration.	Two.	12	20/50 -	Dissection 2 wks. later.	20/30 +
38 F 57	Hard; L. E.	Faint corneal macula.	Normal.	By spatula.	Normal.	No incarceration.	Three.	16	20/100	Dissection in 3 wks. later.	20/50 -
39 F 69	Hard; L. E.	Broad arcus senilis.	Patient very hard to manipulate; prolapse of vitreous and partial disloc. of lens.	By spatula.	Very slow.	Iris incarcerated.	One.	29	20/200	Dissection 2 wks. later.	20/40 -
40 M 58	Hard nucleus; cortex; R. E.	Bright's disease, primary pithitis.	Normal.	Spontaneous.	Normal.	No incarceration.	None.	14	2/50 +	Dissection 3 wks. later.	20/20 -
41 M 66	Hard; R. E.	None.	Normal.	Spontaneous.	Normal.	No incarceration.	None.	11	20/50 +	Dissection 2 w. later.	20/20
42 F 51	Hard; L. E.	Bright's disease.	Normal.	Spontaneous.	Slow; protruded gaping of ext. lips of wound.	Iris puckered & patent.	One.	26	20/100 +	Patient would not consent to a dissection.	20/50 -
43 F 70	Hard; R. E.	Very broad arcus senilis; marked senility of patient.	Slight loss of vitreous; some fragments of cortex left in anterior chamber.	By spatula.	Normal, but rather slow.	Iris incarcerated.	None.	19	20/200 +	Dissection 1 month later.	20/50 +
44 F 32	Hard; R. E.	None.	Normal.	Spontaneous.	Normal.	No incarceration.	One.	12	20/50		20/30

No.	Nature of cataract.	Complications.	Operation.	Reduction of l. iris.	Healing process.	Secondary prolapse or incarceration of iris.	Posterior synechia.	Duration of treatment.	Primary vision.	Secondary operation.	Ultimate vision.
45 M 49	Semi-hard; L. E.	Very murky patient.	Normal, but protracted.	Spontaneous.	Normal.	No incarceration.	None.	Days 16	20/70	Dissection 3 wks. later.	20/40+
46 M 58	Hard; L. E.	None.	Normal.	Spont.	Normal.	No incar.	One.	13	20/40-	Dissection 1 mo. later.	20/30-
47 F 66	Hard; L. E.	Old choroiditis in R. E.	Slight loss of vitreous.	By spatula.	Normal.	No incarceration.	Three.	20	20/200	Choroiditis found after dissection.	20/70
48 M 53	Hard; R. E.	None.	Normal.	Spont.	Normal.	No incar.	None.	14	20/40-	Removal of large irregularly triangular piece of iris and false membrane by Wecker's scissors.	20/30
49 F 75	Hard; R. E.	Chronic bronchitis, asthma, and nasopharyngeal catarrh.	Vitreous prolapsed as seen removed by blunt hook without opening the capsule; large amount of vitreous lost.	By spatula.	Iritis and infiltration of lips of wound; hot water, atropia, and galvanocautery, the latter applied twice.	No incarceration.	Dense false membr. covering entire pupil.	43	Light.	Dissection 10 d. later.	20/100+
50 F 50	Hard; R. E.	None.	Normal.	Spont.	Normal.	None.	Two.	12	20/50+	Dissection 2 wks. later.	20/30-
51 F 42	Semi-hard; L. E.	Chorio-retinitis syphilitic in R. E.	Normal.	Spontaneous.	Normal.	None.	One.	15	20/200	Dissection 2 wks. later.	20/70+
52 F 61	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	Three.	18	20/70-	Dissection 1 st d. later.	20/30+
53 M 58	Hard; L. E.	None.	Normal.	Spontaneous.	Normal.	None.	One.	12	20/70+	Declined any further operation.	20/40-
54 M 59	Hard; L. E.	None.	Normal.	By spatula.	Normal.	None.	None.	14	20/70-	Dissection 8 d. later.	20/40
55 F 64	Hard; R. E.	Slight macula of cornea.	Normal.	By spatula.	Slow.	Iris incarcerated.	None.	22	20/100	Dissection 4 wks. later.	20/70+
56 F 70	Hard; L. E.	Broad arcus senilis.	Normal.	By spatula.	Slow, especially in external lips of wound. Normal; iris contracted under eserine.	Iris incarcerated.	None.	24	20/70	Dissection 6 wks. later.	20/40
57 M 48	Translucent in confusion; no wound of cornea; L. E.	Iris moderately dilated and immovable.	Slight loss of vitreous.	By spatula.	Normal.	No incarceration.	Two.	20	20/70-	Dissection 6 wks. later.	20/30
58 M 63	Hard; L. E.	Severe syphilitic iritis.	Normal.	Spont.	Normal.	None.	None.	14	20/50	Free dissection 5 wks. later.	20/40
59 M 57	Hard; L. E.	Several posterior attacks of syphilitic iritis.	Normal, but somewhat protracted.	By spatula.	Slow iritis.	None.	Several.	22	20/200	Dissection 5 wks. later.	20/50
60 F 78	Hypermetropic; R. E.	Br'd arc. sen.; chron. bronch.	Normal.	By spatula.	Very slow.	Incarceration of iris.	None.	24	20/100	Dissection 2 w. later.	20/70-
61 F 60	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	One.	16	20/70+	Declined any further operation.	20/40+
62 M 56	Hard; L. E.	None.	Normal.	Spontaneous.	Normal.	None.	Two.	15	20/70	Dissection 4 w. later.	20/50+
63 M 68	Hard; L. E.	Com'l macula.	Normal.	Spont.	Normal.	No incar.	One.	12	20/200	Dissection 4 w. later.	20/70-
64 F 69	Hard; R. E.	None.	Normal.	Spont.	Normal.	None.	Two.	15	20/50+	Dissection 3 w. later.	20/40
65 F 62	Hard; R. E.	None.	Normal.	By spatula.	Normal.	Iris picked up.	One.	17	20/200+	Dissection 5 w. later.	20/50+
66 M 71	Hard; R. E.	Broad arcus senilis.	Normal.	By spatula.	Slow.	None.	None.	20	2/10	Dissection 2 wks. later.	20/40
67 M 50	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	Two.	10	20/50	Dissection 2 wks. later.	20/40+
68 F 36	Soft; L. E.	None appearing.	Normal.	Spontaneous.	Normal.	None.	One.	16	20/70+	Dissection 2 mos. later.	20/40+
69 F 61	Hard; R. E.	Chr. bronch. and asthma.	Normal.	By spatula.	Very slow; patient can not lie down at all.	Iris incarcerated.	None.	17	20/200+	Dissection 4 w. later.	20/70+
70 M 72	Hard; R. E.	None.	Slight loss of vitreous.	Spont.	Very slow; the external lips of the wound not healing for four wks.; some pain; a slow inflammation of the folds of the iris of the vitreous continuing for several weeks.	No incarceration.	One.	27	20/200	Dissection 2 mos. later.	20/100+
71 F 87	Hypermetropic; R. E.	Chronic bronchitis; cataract well advanced in L. E.	Normal.	By spatula.	Normal.	No incarceration.	Several.	30	Counting fingers at one ft.	None deemed advisable.	Fingers counted at three feet.
72 F 61	Hard; R. E.	None.	Normal.	Spont.	Normal.	None.	Two.	16	20/70	Dissection 3 w. later.	20/40+
73 M 57	Hard; L. E.	None.	Normal.	Spontaneous.	Normal.	None.	None.	18	20/100	Dissection 4 wks. later.	20/50+
74 M 56	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	None.	14	20/50+	Dissection 3 w. later.	20/20-
75 F 63	Hard; R. E.	Chronic hypertrophy and valvular disease of the heart.	Retraction of iris; loss of vitreous; lens removed with hook.	By spatula.	Violent irido-cyclitis, with plastic exudation, entirely blocking the pupil.	None.	Almost complete adhesion of iris to capsule.	30	Perception of light.	One mo. later division of the iris & pseudomembr. in a diagonal direction downward and outward with narrow knife.	20/20-
76 F 52	Hard; L. E.	Central macula of cornea.	Normal.	Spontaneous.	Normal.	None.	None.	12	20/100	Dissection 4 wks. later.	20/40
77 M 70	Hypermetropic; R. E.	Broad arcus senilis.	Normal.	By spatula.	Iritis of mild type.	None.	Several.	17	20/100	Declined operation.	20/100
78 M 70	Hypermetropic; R. E.	Chron. blepharoadentitis.	Loss of vitreous.	By spatula.	Iritis.	None.	Several.	22	20/200	Dissection 5 wks. later.	20/70+
79 M 70	Hard; R. E.	Patient very feeble and badly nourished.	Retraction of iris toward ciliary processes, and lens removed with difficulty.	Spontaneous.	Infiltration of lips of wound, and some hydropygm on 3d d.; free day, and application of galvanocautery to whole length of wound.	Prolapse of iris on eighth day, and left undisturbed.	None.	39	20/200	Dissection 3 w. later.	20/40-
80 F 64	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	None.	15	20/70+	Dissection 3 wks. later.	20/40-
81 F 69	Hard; L. E.	Corneal mac.	Normal.	By spatula.	Normal.	None.	None.	16	20/200	Dissection 3 wks. later.	20/50+
82 M 51	Semi-hard; R. E.	Diabetes mellitus.	Normal.	Spontaneous.	Slow.	None.	One.	18	20/50-	Dissection 3 wks. later.	20/30+
83 F 56	Hard; B. E.	None.	Normal.	Spont.	Normal.	None.	None.	12	20/40-	Dissection 3 w. later.	20/30+
84 M 65	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	None.	14	20/70+	Dissection 2 wks. later.	20/50+
85 M 54	Semi-hard; L. E.	Diabetes mellitus.	Normal.	Spontaneous.	Slow.	None.	None.	23	20/100	Dissection 2 wks. later.	20/50+
86 M 42	Traumatic; R. E.	C'n'ture of eyeball from blow.	Normal.	By spatula.	Iritis.	None.	Several.	19	20/70+	Dissection on 17th day after extraction.	20/30-
87 M 46	Traumatic; L. E.	None.	Normal.	Spontaneous.	Normal.	None.	None.	11	20/50-	Dissection 3 wks. later.	20/30
88 F 68	Hard; L. E.	Chronic.	Normal.	Spont.	Slow.	None.	Two.	26	20/70+	Declined operation.	20/40+
89 F 52	Immature in B. E.	Bright's dis.	Normal.	Spontaneous.	Iritis.	None.	Several.	23	20/200+	Dissection 3 wks. later.	20/50+
90 M 70	Hard; L. E.	None.	Normal, with slight loss of vitreous.	By spatula.	Normal.	Incarceration of wound on 3d day; galvanocautery at orifice.	None.	16	20/50	Declined operation.	20/40
91 F 63	Hard; R. E.	Feeble patient.	Normal.	By spatula.	Normal.	Incarceration of iris.	None.	29	20/200	Dissection 2 w. later.	20/70-
92 M 59	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	One.	14	20/50-	Dissection 2 w. later.	20/40+
93 F 64	Hard; L. E.	None.	Normal.	By spatula.	Normal.	None.	None.	16	20/100	Dissection 3 w. later.	20/50+
94 F 71	Hard; R. E.	Corneal macula.	Normal.	By spatula.	Slow.	Incarceration of iris.	None.	20	20/300	Dissection 3 w. later.	20/100
95 M 59	Hard; R. E.	None.	Normal.	Spont.	Normal.	None.	None.	14	20/100+	Dissection 3 w. later.	20/40+
96 F 30	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	None.	16	20/70+	Dissection 4 w. later.	20/50+
97 F 66	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	Two.	17	20/100+	Dissection 2 w. later.	20/50+
98 F 61	Hard; R. E.	None.	Normal.	By spatula.	Slow.	Iris incarcerated.	None.	29	20/70+	Declined any further operation.	20/50+
99 M 36	Hard; R. E.	None.	Normal.	Spont.	Normal.	None.	None.	13	20/70+	Dissection 4 w. later.	20/20-
100 M 39	Hard; L. E.	None.	Normal.	Spont.	Normal.	None.	None.	15	20/50-	Dissection 4 w. later.	20/20



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